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ON *FILINIA TERMINALIS* (PLATE) AND *F. PEJLERI* SP. N. (ROTATORIA: FAMILY TESTUDINELLIDAE)

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In 1886, Plate described, as *Triarthra terminalis*, a rotifer found in the spring, in the vicinity of Bonn, which differed from *T. longiseta* Ehrenberg, now referred to *Filinia*, in having the posterior appendage inserted apically, rather than ventrally some little distance from the posterior end of the body. Apart from usually lacking spines on the appendages (such spines were present on one specimen), the new species appears to have resembled *Filinia longiseta* in shape and general characters. Plate gave no figure, but Calman (1892) who may be regarded as the first reviser relative to *T. terminalis*, illustrated a single specimen from Dundee tap water (fig. 1b), which clearly belongs, in spite of subsequent erroneous statements for which I am partly responsible, with the European species later discussed by Carlin and Pejler, and referred by the latter to *F. terminalis* (Plate).

Pejler (1957a, b) gives the most complete account of the species. It appears in Europe to be a cold stenotherm organism, known from Swedish Lapland southward to Switzerland,

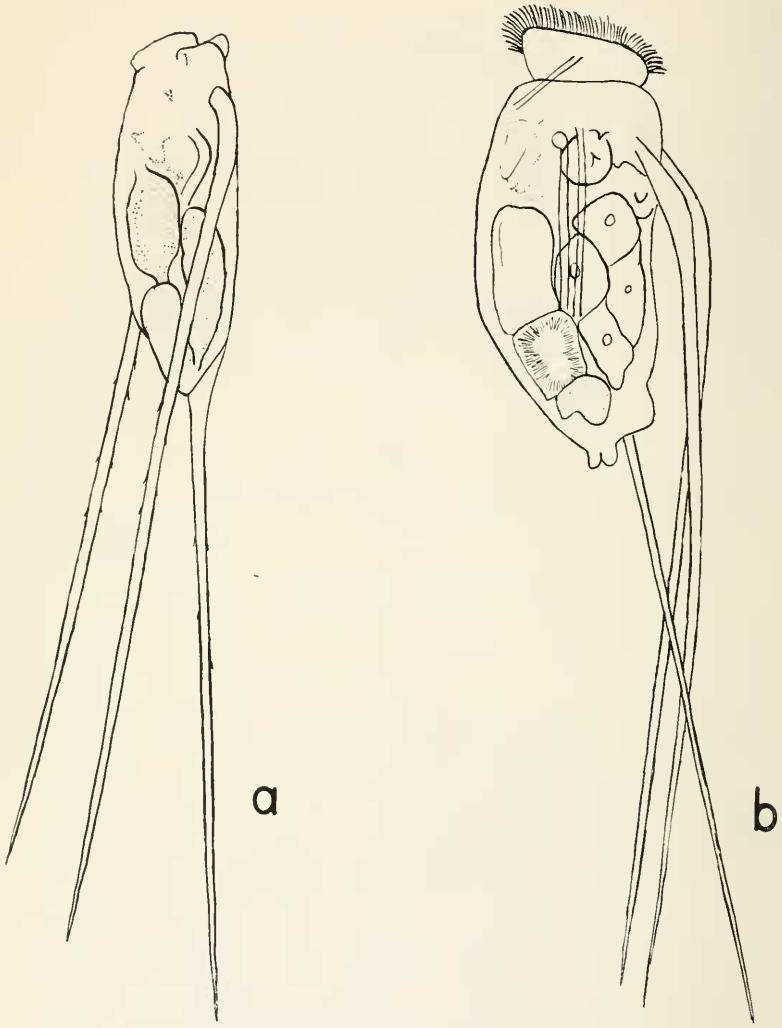

Figure 1a. *Filinia pejleri* sp. n. Ootacamund, Nilghiri Hills, S. India (*holotype*), ×230. Figure 1b. *F. terminalis* (Plate), first figured specimen, Dundee, Scotland; after Calman (1892).

and as Voigt (1957) correctly indicates, recorded as *F. longiseta* by Edmondson and Hutchinson (1934) from Ladakh and Kashmir. In *F. terminalis* the insertion of the posterior appendage, if not terminal, is less and usually much less than

10μ from the posterior end of the body. Such animals were regarded as a cyclomorphotic winter form of *F. longiseta* by Slominski (1926), who seems to have found *F. limnetica* during the summer and *F. terminalis* during the rest of the year in the Polish locality that he studied. It is evident, however, that *terminalis* can occur as the only planktonic member of the genus in a lake, as in the Mansfelder See (Colditz, 1914). Both Carlin (1943) and Pejler (1957a, b) make an excellent case for regarding *terminalis* as distinct from *longiseta*, though Carlin, following Edmondson and Hutchinson's (1934) misidentification of *terminalis*, believed the first valid name of the species to be *major* Colditz.

There is also in Europe an array of forms in which the posterior appendage is inserted well in front of the posterior apex of the body, the distance between insertion and posterior end varying from rather over 10μ in small to over 30μ in large specimens. In Scandinavia these animals can be separated into two discontinuous groups; in one the anterior appendages are less than 350μ long, in the other more than 400μ long. The ratio of posterior to anterior appendage length is greater in the first than in the second group. Carlin (1943) regarded the two groups as species; namely, *F. longiseta* (Ehrenberg) living in ponds and *F. limnetica* (Zacharias) living in lakes. Voigt (1957) accepted Carlin's separation, though it is very probable that Voigt's conception of *longiseta* would include specimens of *limnetica*.

Plotting the length of the posterior appendage against the mean length of the two anterior appendages for all specimens of *longiseta*, *terminalis* and *limnetica* from Sweden, Pejler found evidence of two regression lines converging in an area occupied by points defining *longiseta* s. str. When, however, a double logarithmic plot is made it appears that the Scandinavian data give envelopes around two parallel straight lines with a slope of about 1.33. One line runs through the envelopes of *terminalis* and *longiseta*, the other through that of *limnetica*. Pejler was doubtful as to the specific separation of *longiseta* and *limnetica*, since a few specimens, marked by saltires (×) in figure 2, taken in ponds and rivers in central Europe, appeared to be intermediate. In view of the great number of points

defining the envelopes, seventy for *terminalis*, forty-one for *limnetica* and seventeen for *longiseta*, it seems likely that these points, probably not related to the ordinary growth patterns of the individual species involved, represent introgressive hybridisation, or perhaps very large specimens of *longiseta* with broken posterior appendages. The specimens recorded as *longiseta* from the lake at Ootacamund by Edmondson and Hutchinson (1934) are certainly referable to *F. limnetica*, as indicated by the open circles in figure 2.

Parise (1961) has considered several Italian populations, which must be discussed in the present context (figure 3).

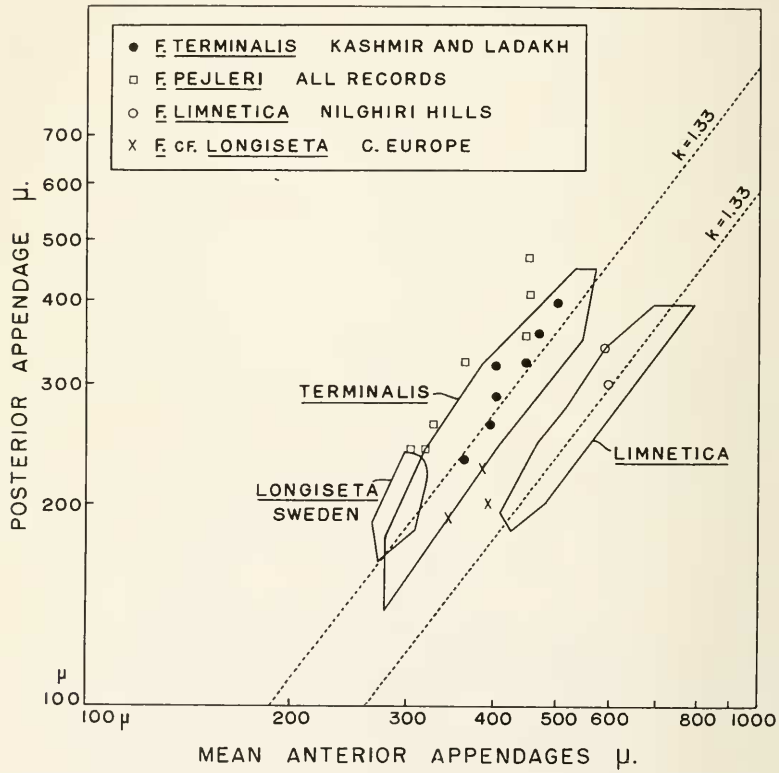

Figure 2. Relationship of length of posterior appendages to mean length of the anterior in *F. longiseta* (Ehrenberg), *F. terminalis* (Plate), *F. limnetica* (Zacharias) and *F. pejleri* sp. n., based on measurements of Pejler and the present author.

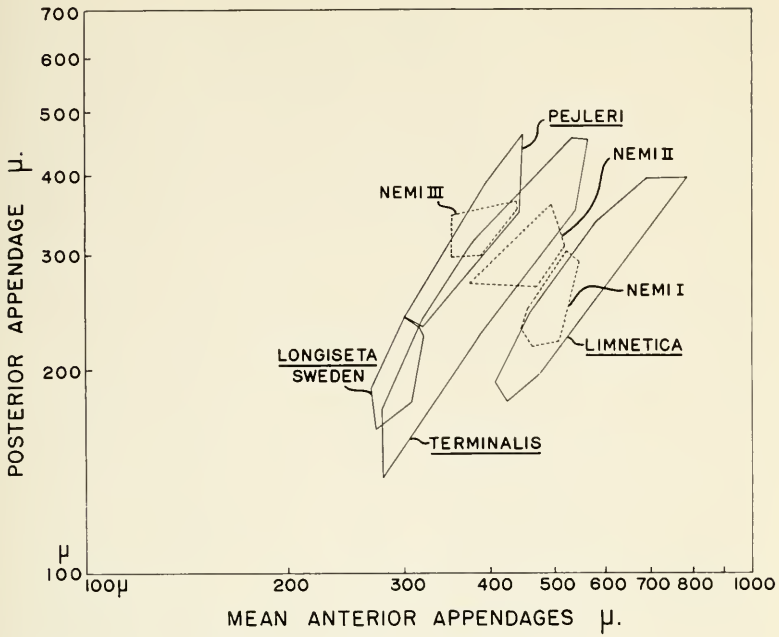

Figure 3. Envelopes of figure 2 with those of the three populations (dotted lines) of Lake Nemi, from Parise.

In Lake Nemi three populations have occurred during the history of partial drainage and refilling of the lake. One of these (Nemi I), when the appendage lengths are plotted logarithmically gives a set of points falling within an envelope on the upper side of that of *F. limnetica*. Parise says nothing definite about the insertion of the posterior appendage in this population. Apart from a graphical presentation of appendage measurements and a statement that the appendages carry barely visible spinules, he remarks only that "la forme du lac n'accorde pas avec *Filinia limnetica* Zacharias" though the basis of this statement is far from clear.

The other two populations are both tentatively considered in relation to *F. terminalis*, having a clear apical insertion of the posterior appendage. One (Nemi II) was present only in April, 1934, and consisted entirely of mictic females. Most specimens fall within the range of *F. terminalis* as established by Pejler, though a few have relatively slightly longer anterior

appendages. The third population (Nemi III), amictic and with a relatively longer posterior appendage, occurred sporadically between 1922 and 1926. It is compared by Parise with a cold water population from Lago di Garda, which is presumably *terminalis*. From its position on the diagram of figure 3, however, one might suspect that the Nemi III population really belonged with the warm stenotherm species to be named below and that at different times all three of the limnoplanktonic species here discussed have occurred in the lake. In default of information on the body shape and on the seasonal occurrence of this population, no further conclusions are possible.

In a population from a pond in the vicinity of Padua, the distance between the insertion of the posterior appendage and the apex of the body is said to be variable and of no value as a taxonomic character. The population would fall entirely within the envelope of Nemi III in figure 3, but is doubtless referable to a large long-spined form of the true *F. longiseta*.

Hutchinson, Pickford and Schuurman (1932) recorded from South Africa, on the strength of an identification by the late David Bryce, a species that they called *F. terminalis* but which is obviously very different from the cold stenotherm species discussed in the preceding paragraphs. With the possible exception of the Nemi III population, no European specimens comparable to those from South Africa appear to be recorded (Hauer *in litt.*; Edmondson, 1935; Voigt, 1957). As Pejler points out, Hutchinson, Pickford and Schuurman (1932) were clearly in error as to their identification, as were Edmondson and Hutchinson (1934) when they recorded the same species from the lake at Ootacamund, and Edmondson (1935) when he noted the species from Mormon Lake, Arizona.

In view of the necessity of having a valid name for this species in the discussion of the rotifers of the zooplankton in the forthcoming second volume of my *Treatise on Limnology*, I feel justified in putting forward as new,

Filinia pejleri sp. n.

Filinia terminalis Hutchinson, Pickford and Schuurman (1932), Edmondson and Hutchinson (1934), Edmondson (1935), Voigt (1957).

nec *Triarthra terminalis* Plate (1886), Calman (1892).

nec *Filinia terminalis* Pejler (1957a, b)

Body fusiform, from two and a quarter to over three times as long as deep, hardly rounded dorsally, appendages minutely spinulose, posterior seta with a broad oblique base inserted terminally at the hind end of the body (fig. 1).

	Length of body	Dorso-ventral Depth	Length / Depth	Right Anterior Appendage	Left Anterior Appendage	Posterior Appendage
Ootacamund, S. India	138μ*	54μ	2.56	342μ	300μ	242μ
	138	50	2.60	330	330	262
	142	58	2.45	308	333	242
Ruitkuil Pan, Transvaal	138	56	2.50	456 (±, stuck together)		456
	145	56	2.67	318 (±)	408	401
	124	56	2.25	415	422	325
Mormon Lake, Arizona	200	60	3.33	432	480	360

* Dimensions in the first line refer to the holotype.

Holotype: (YPM: Aschelminthes 25) Artificial Lake, Ootacamund, Nilghiri Hills, S. India; townet collection, 8 Nov. 1932, pH 6.6, temp. 17.5°C. (figure 1a; previously also figured by Edmondson and Hutchinson, 1934, fig. 2C).

As Edmondson and Hutchinson point out, the largest specimens of the true *F. terminalis*, referred by them to *longiseta*, have a ratio of body length to depth overlapping that of *pejleri*. The latter, however, may always be separated by its more spindle-shaped body, with the dorsal surface hardly more rounded than the ventral. In contrast even the longest *terminalis* have a gibbous dorsal profile. It is also probable that the larger *pejleri* are proportionately narrower than the smaller, so that for any absolute size the ratio of length to depth would prove diagnostic.

If the posterior appendage length is plotted against the mean length of the anterior appendages, the points for *pejleri*

fall along the upper edge of the envelope defining this relationship in *terminalis*. *F. pejleri* is probably eurytopic chemically, occurring in the neutral waters of the type locality and in somewhat alkaline waters in the Transvaal. Its distribution suggests that it requires a warm temperate climate. It can occur, as at Ootacamund, sympatrically with *F. limnetica*.

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